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Provisional T-Stenting With Bioresorbable Vascular Scaffolds In Vivo

Insights From Optical Frequency Domain Imaging

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Provisional single-stenting is the preferred strategy for the treatment of coronary bifurcation lesions (1). In cases where the side branch (SB) suffers from flow compromise following main-branch (MB) stenting, stent implantation in the SB ought to be considered (2). Currently, the use of bioresorbable vascular scaffolds (BVS) (Abbott Vascular, Santa Clara, California) is expanding from simple to complex lesions including those at bifurcation sites. Bench testing has suggested that dilation with a small balloon toward the SB through the MB BVS is acceptable, although in vivo data are limited (3). We report the optical frequency domain imaging (Terumo Corp., Tokyo, Japan) of BVS implantation in vivo obtained at each step of the provisional T-stenting technique.

Optical frequency domain imaging following implantation of a 3.0 × 28 mm BVS on the proximal left anterior descending artery demonstrated the diagonal ostium was jailed by the scaffold struts (4) (**Figures 1A and 1B**). Proximal optimization technique was then performed (**Figure 1C**). This was followed by balloon dilation from the MB into the diagonal branch with a 2.0 × 15 mm device (**Figures 1D and 1E**). A 2.5 × 28 mm BVS was subsequently implanted in the diagonal branch using the T-stenting technique followed by final kissing balloon inflation with minimal protrusion of the diagonal balloon into the left anterior descending artery (**Figure 1F**). Optical frequency domain imaging demonstrated good BVS expansion and apposition in both branches and complete coverage of the diagonal ostium with no evidence of BVS disruption (**Figures 1Ga to 1Gf** and **Figures 2A to 2D**). Visual assessment confirmed optimal T-stenting with no geometric miss at diagonal ostium and no BVS disruption (**Figures 2E, 2F, and 2F′**).

This report suggests the following: 1) small balloon dilation of MB-BVS struts toward SB appears to be feasible; 2) BVS (thickness = 157 μm) can be delivered into the SB through the gently dilated MB-BVS struts; and 3) final kissing balloon inflation is also possible with no disruption of the implanted BVS. This preliminary experience needs to be confirmed in a large series.

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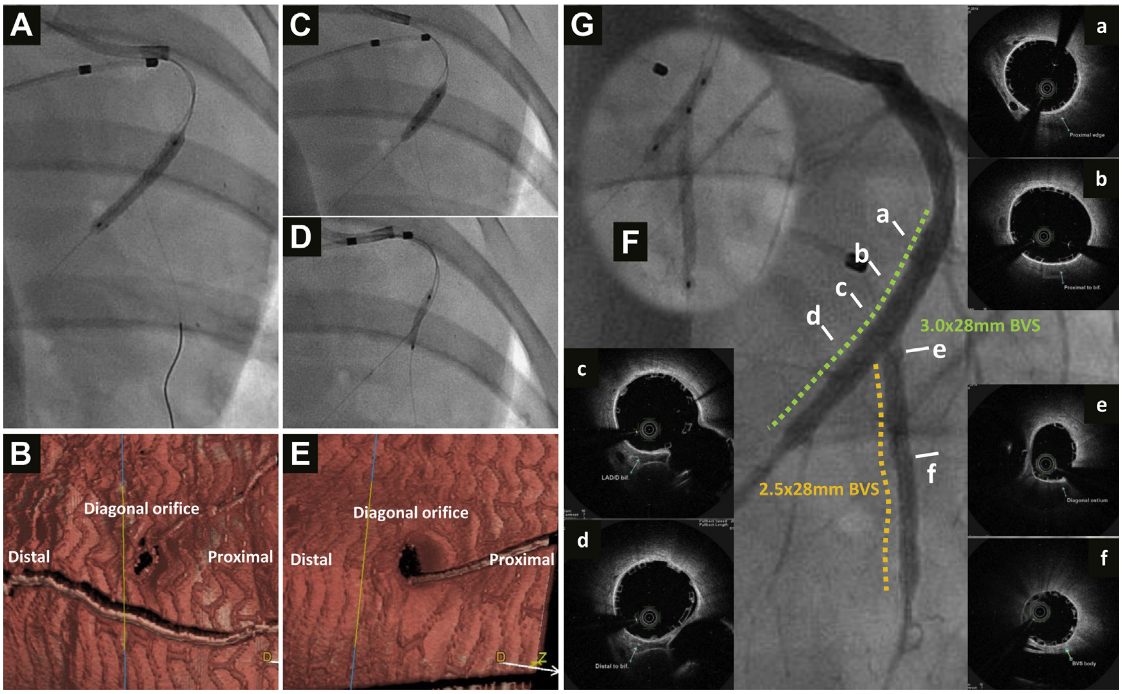
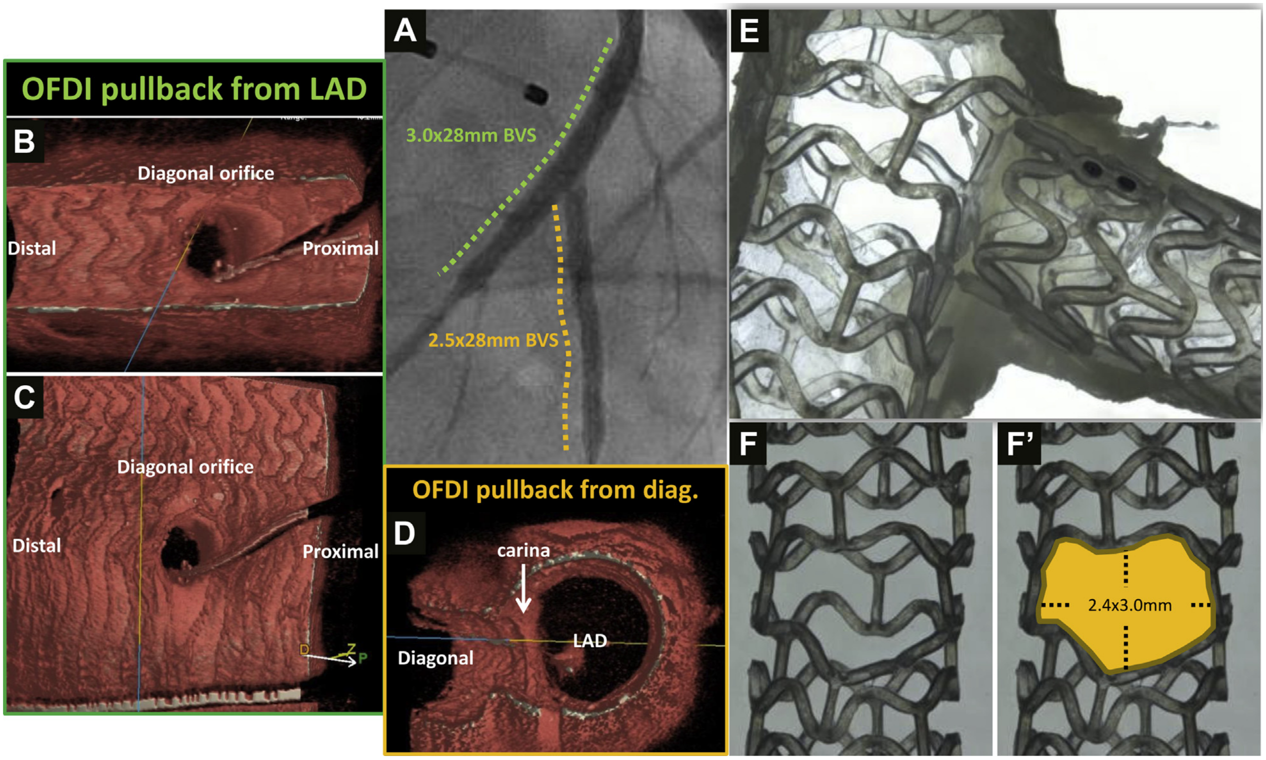
FIGURE 1 Provisional T-Stenting With BVS



(A) Implantation of a 3.0 × 28 mm BVS at nominal pressure (7 atm) on the proximal LAD resulted in the jailing of the diagonal branch in a swine. **(B)** OFDI demonstrating the jailed diagonal orifice by the scaffold struts in a "T type." **(C)** Proximal optimization technique with a 3.25-mm noncompliant balloon (20 atm). **(D)** Dilation with a 2.0-mm balloon at 6 atm toward the diagonal branch. **(E)** OFDI demonstrating an improved diagonal orifice area with no evident disruption of the MB scaffold. **(F)** Final kissing balloon inflation (3.0 mm/2.5 mm balloons at 6/6 atm for the LAD/diagonal branches) with small balloon overlapping like a "T" after implantation of a 2.5 × 28 mm BVS on proximal diagonal branch. **(G)** Final angiographic result. **(a)** Good scaffold apposition at the proximal edge (BVS diameters = 3.2 × 3.3 mm). **(b)** Good scaffold apposition just proximal to the LAD/diagonal bifurcation (BVS diameters = 3.3 × 3.4 mm). **(c)** No evidence of scaffold disruption at the bifurcation site. **(d)** Good scaffold apposition distal to the bifurcation (BVS diameters = 3.0 × 3.1 mm). **(e)** Good scaffold apposition at the diagonal ostium (BVS diameters = 2.2 × 2.5 mm). **(f)** Good scaffold apposition at the BVS body in the diagonal branch (BVS diameters = 2.5 x 2.5 mm). BVS = bioresorbable vascular scaffold; LAD = left anterior descending artery; OFDI = optical frequency domain imaging.

FIGURE 2 **Optimal T-Stenting Without Evidence of Scaffold Disruption**



(A) Final angiography. **(B)** OFDI demonstrating a good diagonal orifice area with no evidence of scaffold disruption. **(C)** Carpet view of Figure 2B. **(D)** OFDI demonstrating the neocarina at the LAD/diagonal bifurcation. **(E)** Zoomed-in picture showing optimal T-stenting with no geometric miss at the diagonal ostium. **(F)** Adequate scaffold cell area of the LAD BVS at the site of the diagonal orifice with no evidence of BVS disruption. **(F′)** Figure 2F with the dilated scaffold cell highlighted in **yellow** (2.4 $\times$ 3.0 mm). Abbreviations as in Figure 1.

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KEY WORDS bifurcation, bioresorbable vascular scaffold, optical frequency domain imaging, provisional T-stenting